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Facial reconstruction in mucormycosis: A case report

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Case report

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Background

INTRODUCTION: Mucormycosis is a rare opportunistic infectious pathology of angioinvasive fungal etiology produced by fungi of the order Mucorales characterized by a rapidly progressive invasion of the host vasculature by hyphae, resulting in ischemia and tissue necrosis (7,8). Its management requires radical surgical debridement that can lead to complex tissue defects with significant functional and aesthetic implications. (11,12)

CASE PRESENTATION: We present the case of a 55-year-old patient with a history of rhino-orbito-maxillary mucormycosis that required multiple surgical debridement along with right maxillectomy and resection of the nasal septum and right pterygoid process, in order to achieve control of the infectious focus. The patient underwent reconstruction with a composite fibula free flap using a microsurgical technique, achieving total closure of the oronasal and oroantral fistula, improving malar projection and facial symmetry, obtaining favorable aesthetic and functional outcomes.

CONCLUSION: The recent available literature and this case report, support the use of free flaps as a good alternative for the reconstructive approach in mucormycosis.

Keywords: Mucormycosis, face reconstruction, head and neck reconstruction.

Mucormycosis is a rare opportunistic infectious disease of angio-invasive fungal etiology produced by fungi of the order Mucorales, whose spores can enter the body by inhalation, ingestion, or direct inoculation. It can present in a localized or disseminated form and is classified according to the clinical presentation, being the rhino-cerebral, pulmonary, cutaneous and gastrointestinal the most common forms. This pathology is associated with immunodeficiency conditions, diabetes being the most common, followed by renal failure, high-grade burns, malnutrition, and organ transplantation. However, immunocompetent people may also be affected when the spore is inoculated directly into the skin as a result of trauma or burns. (1-7)

Mucormycosis is characterized by rapidly progressive invasion of the host vasculature by hyphae, resulting in ischemia and tissue necrosis. The most frequent clinical presentation is rhino-cerebral infection, presenting with symptoms of acute sinusitis, fever, purulent rhinorrhea, and headache; and clinical signs such as nasal ulceration, periorbital edema, loss of visual acuity, and ophthalmoplegia. (7,8)

This disease requires comprehensive and multidisciplinary management that includes antifungal therapy with amphotericin B, surgical management with radical debridement of the affected tissues, and control of underlying pathologies, in order to prevent progression and improve survival. Surgical debridement of infected and necrotic tissue must be performed aggressively and as a priority, due to the rapid local progression and spread of the disease, as well as the low penetrance of antifungal drugs in necrotic tissues, a consequence of the thrombosis and angioinvasion characteristic of mucormycosis (9-11). However, these radical surgical debridement lead to large coverage defects, affecting both anatomical and functional structures, which constitute a challenge from the reconstructive perspective. (12) We present the case of a patient with rhino-orbito-cerebral mucormycosis who underwent reconstruction using microsurgical technique, obtaining satisfactory aesthetic and functional results.

Case report

We present the case of a 55-year-old patient with a history of type 2 diabetes mellitus who was referred to our service for reconstructive management after suffering rhino-orbito-maxillary mucormycosis secondary to a post-exodontia alveolitis. In initial management, the patient was treated with intravenous antifungal therapy and required multiple surgical debridement plus right maxillectomy with resection of

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Figure 1. Preoperative assessment with asymmetry of the midface and loss of the right maxillary projection, as well as a large oronasal fistula associated with dystopia of the nasal tip.

the nasal septum and right pterygoid process, in order to achieve control of the infectious focus.

Initial assessment (Figure 1) revealed asymmetry of the midface with loss of the right maxillary projection, as well as a large oronasal fistula associated with dystopia of the nasal tip, along with ipsilateral amaurosis. In admission studies (CT and nasosinuscopy) involvement of the lower and lateral wall of the right orbit was observed (Figure 2 A.), with chronic inflammatory changes of the maxillary antrum.

The patient was considered a candidate for reconstruction with a composed free flap of the fibula. Initially, the maxillofacial surgery service performed the orbital floor reconstruction with a titanium prosthesis designed with prior three-dimensional planning and cutting guides. In the same surgical time, it was performed the design, dissection and lifting of the fibula free flap with muscle portion and skin island. The flap was transposed to the facial region with screw fixation to the right zygomatic arch and to the anterior wall of the maxillary sinus and left zygomatic arch. (Figure 2 B). Microvascular anastomosis to the superficial temporal artery and vein was performed. Subsequently, the dead space was obliterated with the muscular portion of the flap and the fistula in the oral cavity was closed with the skin island. Primary closure was performed in the donor area and split-thickness skin graft was used to cover the residual defect.

In the immediate postoperative period, total closure of the oronasal and oroantral fistula was evidenced, with improved symmetry in the malar projection and favorable aesthetic and functional outcomes. (Figure 3)

Discussion

Mucormycosis requires comprehensive and multidisciplinary management that includes systemic antifungal therapy, surgical management with radical debridement of the affected tissues, and control of underlying pathologies, in order to prevent the disease progression and improve survival. Roden et al. (13) show that patients with antifungal therapy alone have a survival rate of 64%, those treated with surgery alone have a survival rate of 57%, while those treated with antifungals and surgery have a survival rate of 70%. These radical and extensive surgical debridement,

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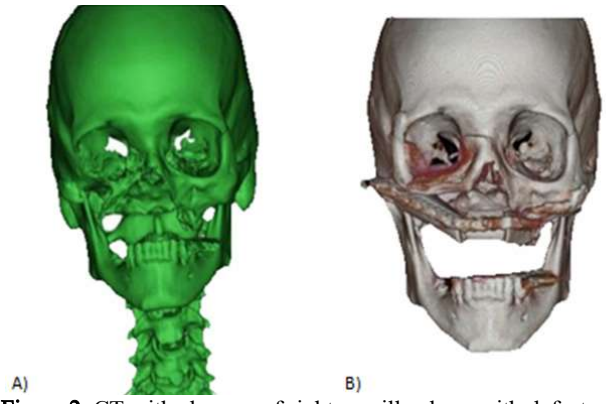

Figure 2. CT with absence of right maxilla along with defect of the floor and lateral wall of ipsilateral orbit. B. Postoperative CT with orbital floor reconstruction with a titanium prosthesis and fibula flap with screw fixation to the right zygomatic arch and to the anterior wall of the maxillary sinus and left zygomatic arch, achieving the restoration of the zygomatic-maxillary pillar.

necessary to control the infectious focus, can lead to complex tissue defects with significant functional and aesthetic implications. (11,12)

Reconstructive planning must be carried out individually for each patient and different reconstructive alternatives must be evaluated under the concept of the "reconstructive elevator"(14), contemplating to restore function and structurality, seeking the best possible aesthetic result, which will allow them to satisfactorily reintegrate into their daily lives. Within the functional objectives, the restoration of nasal breathing, oral nutrition and understandable speech should be sought. (11)

With the advances in microsurgery, free flaps are positioning themselves as a good alternative in the reconstruction of these complex defects in survivors of rhino-orbital mucormycosis. Cheruvu (11) et al carried out a structured review of the literature where 9 cases of mucormycosis with subsequent reconstruction using free composite flaps were retrospectively reviewed, showing a survival of 100% of them. In the case presented, from a compound free flap, the restoration of the zygomatic-maxillary pillar was successfully achieved, along with bone structurality, closure of the oroantral and nasal fistula, as well as obliteration of the dead space, improving symmetry and facial aesthetics.

Conclusions

Mucormycosis generates a high functional and aesthetic impact on patients. In addition to antifungal therapy, its treatment requires aggressive surgical debridement to control the infectious focus and improve the survival rate. For that reason, the comprehensive treatment of this pathology must also consider a reconstructive approach.

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Figure 3. Preoperative and post operative frontal view comparison. It shows satisfactory results in symmetry and facial aesthetics, as well as improvement in facial expression. The vermilion border and upper lip are completely reconstructed with optimal healing results.

Therefore, microsurgery plays a fundamental role in the approach to these patients, since it allows individualizing each case and, as observed in the case described, adjusting surgical techniques according to the functional and aesthetic needs of each clinical case. The recent available literature and this case report, support the use of free flaps as a good alternative for the reconstructive approach in mucormycosis.

Conflicts of interests

The authors have no conflicts of interest to declare that are relevant to the content of this article.

References

1. Skiada A, Pavleas I, Drogari-Apiranthitou M. Epidemiology and Diagnosis of Mucormycosis: An Update. Journal of Fungi. 2020 Nov 2;6(4):265. DOI: 10.3390/jof6040265
2. Prakash H, Chakrabarti A. Global Epidemiology of Mucormycosis. Journal of Fungi. 2019 Mar 21;5(1):26. DOI: 10.3390/jof5010026
3. Steinbrink J, Miceli M. Mucormycosis. Infectious Disease Clinics of North America. 2021 May 18;35(2):435-452. DOI:10.1016/j.idc.2021.03.009
4. Brunet K, Rammaert B. Mucormycosis treatment: Recommendations, latest advances, and perspectives. Journal de Mycologie Médicale. 2020 Sep 1;30(3):101007. DOI: 10.1016/j.mycmed.2020.101007
5. Skiada A, Lass-Floerl C, Klimko N, Ibrahim A, Roilides E, Petrikkos G. Challenges in the diagnosis and treatment of mucormycosis. Medical Mycology. 2018 Mar 10;56(1):S93-S101. DOI: 10.1093/mmy/myx101
6. Cornely OA, Alastruey-Izquierdo A, Arenz D, Chen SC, Dannaoui E, Hochhegger B, et al. Global guideline for the diagnosis and management of mucormycosis: An initiative of the European Confederation of Medical Mycology in cooperation with the Mycoses Study Group Education and research consortium. The Lancet Infectious Diseases. 2019Nov4;19(12). DOI: 10.1016/s1473-3099(19)30312-3
7. Arnáiz-García ME, Alonso-Peña D, del Carmen González-Vela M, García-Palomo JD, Sanz-Giménez-Rico JR, Arnáiz-García AM. Cutaneous mucormycosis: Report of five cases and review of the literature. Journal of Plastic, Reconstructive

& Aesthetic Surgery. 2009Nov;62(11). DOI: 10.1016/j.bjps.2008.04.040
8. Cornely OA, Alastruey-Izquierdo A, Arenz D, Chen SC, Dannaoui E, Hochhegger B, et al. Global guideline for the diagnosis and management of mucormycosis: An initiative of the European Confederation of Medical Mycology in cooperation with the Mycoses Study Group Education and research consortium. The Lancet Infectious Diseases. 2019Nov4;19(12). DOI: 10.1016/s1473-3099(19)30312-3
9. Spellberg B, Edwards J, Ibrahim A. Novel perspectives on mucormycosis: Pathophysiology, presentation, and Management. Clinical Microbiology Reviews. 2005Jul1;18(3):556–69. DOI: 10.1128/CMR.18.3.556-569.2005
10. Reinbold C, Derder M, Hivelin M, Ozil C, Al Hindi A, Lantieri L. Using free flaps for reconstruction during infections by mucormycosis: A case report and a structured review of the literature. Annales de Chirurgie Plastique Esthétique. 2016 Apr;61(2):153–61. DOI: 10.1016/j.anplas.2015.05.006
11. Cheruvu VPR, Khan MM. Reconstruction in Rhino-Orbito-Cerebral Mucormycosis Survivors: A Systematic Review. Eplasty. 2022 Jun 14;22:e20. PMID: 35873068; PMCID: PMC9275414.
12. Wolthers MS, Schmidt G, Gjørup CA, Helweg-Larsen J, Rubek N, Jensen LT. Surgical management of rhinocerebral mucormycosis: A case series. JPRAS Open. 2021 Jul 5;30:33-37. doi: 10.1016/j.jpra.2021.04.013.
13. Roden MM, Zaoutis TE, Buchanan WL, Knudsen TA, Sarkisova TA, Schaufele RL, et al. Epidemiology and Outcome of Zygomycosis: A Review of 929 Reported Cases. Clinical Infectious Diseases Oxford Academic. 2005 Sep 1;41(5):634–53. DOI:10.1086/432579
14. Gottlieb LJ, Krieger LM. From the reconstructive ladder to the reconstructive elevator. Plastic and Reconstructive Surgery Journal. 1994;93(7):1503–4. DOI: 10.1097/00006534-199406000-00027

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